

**IN THE UNITED STATES PATENT & TRADEMARK OFFICE**

**PATENT APPLICATION**

**OF**

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**FOR**

**WIRELESS SYSTEM FOR BROADCASTING, RECEIVING, STORING AND  
SELECTIVELY PRINTING COUPONS AND THE LIKE IN A RETAIL ENVIRONMENT**

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**TITLE: WIRELESS SYSTEM FOR BROADCASTING, RECEIVING, STORING & SELECTIVELY PRINTING COUPONS AND THE LIKE IN A RETAIL ENVIRONMENT**

5 **RELATED APPLICATIONS**

This is a continuation in part of co-pending United States Patent Application Serial No. 09/096,443 filed on June 11, 1998 in the name of Robert T. Kulakowski, Robert Marshall and George J. Rogers for Wireless System for Broadcasting, Receiving and Printing Packets of Information, United States Patent Application Serial No. 09/096,444 filed on June 11, 1998 in the name of Robert T. Kulakowski, Robert Marshall and George J. Rogers for Wireless System for Broadcasting, Receiving and Selectively Printing Packets of Information Using Bit-String Selection Means, and United States Patent Application Serial No. 09/095,820 filed on June 11, 1998 in the name of Robert T. Kulakowski, Robert Marshall and George J. Rogers for Printer Appliance for Use in a Wireless System for Broadcasting Packets of Information.

**BACKGROUND OF THE INVENTION**

**1. Field of the Invention**

The present invention relates generally to a wireless system for broadcasting, receiving and selectively printing packets of information such as redeemable coupons, forms, messages or any other packet of information consisting of text or graphics, or a combination thereof, and, more particularly, to such a system which comprises a method and apparatus for selectively broadcasting such messages through conventional pager network to a network of printer

appliances that are adapted to convert such messages to a readable permanent format such as, for example, a printed copy. In its broadest form the subject system in essence creates a universal delivery system for virtually any type of information packet that is currently delivered using conventional means such as the United States Postal Service or overnight delivery service such as Federal Express, etc. One particularly unique application for such system is the broadcasting and generation of redeemable consumer coupons in printed format that can be redeemed by consumers at retail outlets, although it should be appreciated that the system of the present invention has applicability in generating virtually any type of printed message.

## 2. Description of the Prior Art

The dispatch of packets of printed information, such as consumer coupons, to individual households is well known. Individuals are accustomed to receiving such printed messages from a variety of different sources including the mail, overnight delivery services, house to house door-hanger crews, private runner services, the print media and the like. Conventional methods for dispatching and delivering such printed messages to a large number of individual households are limited severely by the need for manually handling and delivering the printed copy. While these vehicles are capable of handling large volumes of messages on a daily basis, the need to manually deliver such messages imposes certain constraints on the system in terms of both cost and delivery time.

Telecommunications systems for conveying and delivering messages have improved rapidly over the past decade. For example, facsimile systems have become a common method for

the distribution of printed messages and other communications. The speed and cost of such facsimile systems are quite favorable when compared with the conventional methods described above. Facsimile transmissions are, however, severely limited in terms of wide distribution and, generally speaking, are inappropriate for mass, broadcast messaging. The appeal and utility of such transmissions is also somewhat limited by the requirement and expense of telephone line connections.

More recently, the Internet has become a very potent force in delivering printed messages. As with all other forms of delivery systems, however, there are constraints in terms of reach capability, line connection, and the need for a computer and operating software and auxiliary and ancillary systems. Moreover message recipients must be Internet accessible and have a certain degree of computer literacy. Even more importantly, for such a system, the user must assume an active role if the printed messages are to be received.

With respect to redeemable coupons, the most common form of distribution of such products is through the print media, i.e., either as a freestanding insert or as part of a print advertisement in a newspaper or magazine. In addition, many coupons are distributed by direct mail. Although this distribution method is slow and very costly, it can be targeted at specific recipient groups through the use of selected mailing lists. This contact approach is used extensively by mail-order marketers, telephone companies, magazine publishers, and insurance or financial service providers.

While the bulk of manufacturer discount coupons were printed and distributed in conventional methods of home delivery, some are now being presented automatically in-store,

using relatively advanced communications and computer technology. For example, in one such application, a coupon is dispensed at checkout to an exiting customer for use on the next shopping trip. The particular coupon is targeted to the specific product preferences of the customer through analysis and interpretation of her current purchases. This system is supported  
5 by a vast communications network, an extensive computerized database and dedicated in-store computers. The basic purpose of this type of promotion is to encourage a return trip and influence new purchase decisions.

In another, semi-automated in-store coupon dispensing system application, discrete, electro-mechanical dispensers are attached directly to shelves adjacent to the product. The  
10 consumer can then withdraw a coupon and obtain an instant discount on the purchase at checkout. Such a system is directed more to the "impulse" purchase as the consumer moves through an aisle in the store.

A third class of automated, in-store coupon distributing systems are the kiosk or booth dispensers. These booths are generally installed in store entryways to increase exposure and take  
15 advantage of concentrated traffic. A consumer activates the system through a keyboard, touch screen or by swiping a magnetic strip card. The system then presents images of the currently available promotions and the shopper can choose coupons of interest. Problems with such a system include high initial capitalization costs, complex and high-maintenance technology, difficulty of use, and extended selection time on the part of users.

20 For the aforementioned reasons, none of these forms of message delivery offer particularly fast and inexpensive distribution of such messages.

## **SUMMARY OF THE INVENTION**

Against the foregoing background, it is a primary object of the present invention to provide a system for delivering printed packets of information directly to high visibility and high traffic areas within a retail environment, including but not limited to, on the shelf, on an endcap (end of aisle) at the checkout, on a freestanding kiosk or display etc. within a designated store. The printer(s) could be located virtually anywhere in a store.

It is another object of the present invention to provide such a system that is capable of delivering such packets at a low cost when compared to manual delivery systems.

It is yet another object of the present invention to provide such a system wherein the delivery time of such packets can be controlled and, further, where the packet sequencing and dispatching capability is flexible.

It is still another object of the present invention to provide such a system which has a broad and rapid audience reach and which is able to deliver packets of information virtually simultaneously to pre-determined but widely diverse recipient groups, including those within the retail environment.

It is still yet another object of the present invention to provide such a system where the recipient is able to automatically receive a printed copy of the packet of information using a printer appliance.

It is but another object of the present invention to provide such a system that includes means to store the packet of information being delivered for future printing.

It is another object of the present invention to provide such a system that includes means of detecting whether the printed packet of information has been removed and printing a new copy of the packet in the event the printed packet has been removed.

It is but still another object of the present invention to provide such a system in which the packet can be traced to a particular printer appliance, store or store chain/company.

It is yet another object of the present invention to provide such a system that includes a series of printer appliances that require minimal maintenance and attention.

It is still another object of the present invention to provide such a system that influence purchase decisions at the time of entry into a store, and/or during the entire shopping trip throughout the store.

It is but another object of the present invention to provide such a system that reinforces the coupon offer at the shelf or any linked coupon distribution at checkout.

It is but another object of the present system to provide a system whereby supplemental visual messages draw attraction to the printed information.

It is yet another object of the present invention to provide a system for supplying audio supplementary audio messages to draw attention to the printed information.

It is yet another object of the present invention to provide a motion sensing system such that activation of the supplementary systems are triggered or initiated by human presence near the present system (printer).

It is another object of the present invention to provide method and apparatus to effect the objects and advantages of such system.

To the accomplishments of the foregoing objects and advantages, the present invention, in brief summary, comprises a new system for originating, transmitting, receiving, storing and printing packets of information directly to retail stores and the like through a network of unique printer appliances. Such information may constitute redeemable coupons, forms, rebate  
5 instruments, helpful product information, messages, advertisements, warnings, tickets and the like. Since the techniques are essentially electronic in nature, the system eliminates the need to physically handle or deliver such packets that vastly improves its efficiency in terms of delivery cost and time. The severe reach limitations of the facsimile and Internet systems are eliminated since the system of the present invention can operate in a broadcast mode which is optimal for  
10 mass message delivery. With the inclusion of innovative communication filters, the system can limit delivery to a single printer appliance, all printer appliances or a select group of printer appliances.

The system of the present invention does not require the installation of new telephone line connections, requires virtually no technology literacy or any active participation on the part of the  
15 recipient in actually receiving and obtaining printed copies of the information packets being transmitted. Using a novel printer appliance, packets can be delivered to the home, office, store, or automobile or virtually anywhere where electrical power is accessible.

The present system is characterized by an ability to inexpensively reach a precise target in the marketplace with minimal recipient involvement. The essential transmission methodology is  
20 through established national pager networks such as, for example, those operated by PageNet or SkyTel, which are capable of reaching more than 90% of U.S. households. The majority of the



remaining audience can be reached by building relays to operators of local pager networks. In addition, the system may work in conjunction with conventional cellular telephone technology such as, for example, Sprint, MCI, etc. as well as with dedicated satellite transmission systems, or from an RF transmitter from within the store, satellite dish tap, remote control or other source.

- 5 Future versions may employ any current or future wireless broadcast, multicast, or narrow-cast technology for transmission.

Since the audience is accessed in a virtual parallel mode by a broadcasting system, the number of required transmission channels is minimal. In addition, access/delivery costs are very low, i.e., in the hundredths of a cent for a typical packet, depending upon the size of the audience.

10 Although the system employs a broadcast transmission method, the incorporation of blocking filters enables the system to deliver either a specific packet to an individual appliance or to all or substantially all of the printer appliances as well as virtually everything in between.

15 One component of the system is a high-performance, upgradable subscriber database such as, for example, those relational type databases provided by Oracle or Informix, containing detailed bibliographic, demographic and other unique subscriber information. Such information could contain specific store and chain/company information as well as information from the customers within each store and/or chain/company. Such information can be obtained from all sources via survey and response to questionnaires. The versatility of this database combined with the selectivity of the blocking filters permits extremely precise message targeting based on  
20 definable recipient profiles.

A strong advantage of the proposed system is the incorporation of the maintenance-free printer appliances used by proposed recipients of such messages. The basic printer device/appliance is a "printed message appliance" (PMA). The enhanced printed appliance, intended for utilization in a retail environment is a "receiver-printer-dispenser" (RPD). With such  
5 devices, the recipient does not have to assume an active role in the messaging process. There is no need for even minimal technology or computer literacy since the initial setup and subsequent operation are simple and straightforward. So long as the appliance has power and paper, print messages will be automatically received. It is envisioned that most of the messages will be delivered during the night to take advantage of very low traffic on the pager network at such  
10 times. Thus, the incorporation of a printer appliance requiring minimal maintenance and attention is extremely important.

It is contemplated that the system of the present invention will have particular applicability in the promotion and advertising fields, particularly in the distribution and delivery by packaged-goods manufacturers of redeemable coupons and rebates. The majority of coupons are presently  
15 distributed as newspaper inserts or as part of a print advertisement in a newspaper or magazine. However, the device is capable of transmitting, receiving and printing almost any packet of information or graphics.

Other messages that can be distributed include, for example, forms, for almost any promotional or information gathering purpose, including rebates, surveys, contest announcements  
20 and entries, sweepstakes entries etc.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

The foregoing and still other objects and advantages of the present invention will be more apparent from the detailed explanation of the preferred embodiments of the invention in connection with the accompanying drawings, wherein:

5        FIG. 1 is a flow diagram illustrating the information delivery system of the present invention.

FIG. 2 is a sample table for the subscriber directory used in conjunction with the information delivery system of the present invention.

FIG. 3 illustrates the possible profile bit-string groupings that may be used in conjunction with the information delivery system of the present invention.

FIG. 4 is a sample table in which the messages that are stored in the message bank of the present invention.

FIG. 5 is an example of a daily message batch created using the message bank of the information delivery system of the present invention.

15        FIG. 6 is a sample of typical message bit-string destination codes that may be used in conjunction with the information delivery system of the present invention.

FIG. 7 is a sample table of the message code string used in conjunction with the information delivery system of the present invention.

FIG. 8 illustrates the type of data that may be contained in a sample coupon message used  
20    in conjunction with the information delivery system of the present invention.

FIG. 9 illustrates the manner in which the message identification numbers of the information delivery system of the present invention are created.

FIG 10 is a perspective view of the printer appliance used in the information delivery system of the present invention.

5 FIG 11 is a flow diagram illustrating the manner in which the printer appliance of the information delivery system of the present invention operates.

FIG. 12 is a flow diagram illustrating the method for message content processing in the printer appliance of the present invention.

FIG. 13 illustrates the typical eligibility bit-string filter that may be created from the data in the subscriber directory table of FIG. 4.

FIG. 14 is a table illustrating the reception eligibility matching of the printer appliance of the present invention.

FIG. 15 is a flow diagram illustrating the print processing in the printer appliance of the present invention.

15 FIG. 16 is a flow diagram illustrating another embodiment of the information delivery system of the present invention.

FIG 17 is a flow diagram illustrating the manner in which the receiver-printer-dispenser appliance of the information delivery system of the present invention operates.

20 FIG 18 is a perspective view of the receiver-printer-dispenser appliance used in the information delivery system of the present invention.

FIGS. 19-22 illustrate the various types of dispenser configurations for the receiver-printer-dispenser appliances.

FIG. 23 is a sample floor plan illustrating the placement of the various types of dispenser configurations for the receiver-printer-dispenser appliances.

## **DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Referring to the drawings, FIG. 1 is a flow diagram describing the information delivery system of the present invention which includes eight major components: (1) a subscriber directory 10; (2) a system control center 20; (3) a message bank 30; (4) a database manager 40; (5) a transmission sequence compiler 50; (6) a bank of modems 60; (7) a transmitter network 70; (8) and a network of printer appliances or receiver-printer-dispensers 80. It should be appreciated that the subscriber directory 10, the system control center 20, the message bank 30, the database manager 40 and the transmission sequence 50 compiler are software modules that may be maintained on one or a plurality of separate but interconnected or networked computer systems. Such computer systems can be microcomputers to mainframes. Certain software functions of certain modules may be incorporated into any of the appliances.

The subscriber directory 10 is a database and maintains records of all system subscribers, i.e., those individuals, entities, stores or retail establishments who will receive the messages through the printer appliances or receiver-printer-dispensers 80. The subscriber directory 10 is preferably maintained in a conventional database program such as, for example, Oracle, dBase, Paradox. While flat file database programs may be used, relational databases such as the ones described above are preferred.

The subscriber directory 10 maintains the serial numbers of all the printer appliances or receiver-printer-dispensers 80 that have been released to the market place. The appliance serial number for such appliances is very significant because it serves as a message destination code or address for directing messages using the system. Through the database manager 40, the serial

number can be linked to detailed household or retail location information including geographical address and subscriber profile data. The appliance serial number is always printed on all delivered messages. If a message also serves as a discount coupon or other voucher, the identification of the issuing source can be identified upon redemption. This would, for example, enable a promotion  
5 sponsor to track the event and obtain information on the respondents for inclusion in his customer database. A printer appliance owner, including a store, would have the option to deny use of any personal or confidential information for any use for privacy reasons.

Other data that can be maintained by the subscriber directory 10 includes bibliographic, geographic, and specific store location information.

A sample table illustrating the subscriber directory is shown in FIG. 2 and, includes, for  
10 example, information relating to the subscriber's name, address, and geographical region. It should, of course, be appreciated that virtually any type of information concerning the subscriber may be maintained depending upon the particular application.

The information contained in the subscriber directory 10 can be outputted in print form  
15 similar to a regular telephone directory and used by senders in compiling their message lists. A hard-copy directory might be used, for example, by the chain headquarters, the promoter/advertiser, or others to follow-up on activity or performance with personnel in individual stores. Large-scale users such as major grocery chains, national retail chains or mass merchants, may be allowed secured direct access to the directory or provided with magnetic tape,  
20 diskette or ROM forms for assigning serial number usage within their in-house loyalty/frequency programs.

The subscriber directory 10, when affiliated with an in-store loyalty program, potentially has a high commercial value because of the consumer information content and, if desired, may be rented to or shared with manufacturers, direct mail or telephone marketers, per published privacy policies and in accordance with governing laws and proper notification to users.

5        The data contained in the subscriber directory 10 is, in a preferred embodiment, maintained in bit-string format which facilitates the ability to sort such data and subsequently match the data to corresponding requirements in the printer appliances 82 upon broadcast.

10        A sample of possible bit-string groupings is included in FIG. 3 in which multiple digit numbers are assigned to a particular field and data. For example, bits between 000 and 100 may be assigned to the geography and zip code of the subscriber (store); bits 101-130 may be assigned to household or store composition data; bits between 131-160 to the type of home or store; 161-170 to the family income or store traffic patterns by day; 171-200; and above 200 to brand usage or product movement cycles or even product or store/chain competitive information, etc. It is anticipated that up to 1000 bits may be used in this regard although this number may be increased or decreased if necessary.

15        The system control center 20 may be run on most current CPU's including microcomputers and main frame computers and provides overall management and administration for the entire information delivery system. It is composed of a computer and associated input/output peripherals incorporating software modules that perform functions such as:



- 5
- a. Collecting and accepting new system information such as the serial numbers of additional printer appliances or receiver-printer-dispensers, new messages, and new and updated subscriber profile data.
  - b. Relaying and entering new information to the appropriate repositories, e.g., new serial numbers to the subscriber directory 10, messages to the message bank 30 and profile information to the database manager 40.
  - c. Editing, updating and generally maintaining the subscriber directory 10, message bank 30, and database manager 40.
  - d. Providing support to the database manager 40 and transmission sequence compiler 50 in posting and dispatching messages, and tracking sender volumetrics for billing.

10

Basic utilities to support the above functions generally exist within the management system of modern database products.

15

The message bank 30 is a table in a database of the type such as, for example, Oracle, dBase, Paradox, etc. The message bank 30 serves as a vast repository for collecting and storing messages pending distribution. It would preferably have a highly versatile data reception capability to permit messages to be received electronically, recovered from storage media such as disk, ROM, swipe cards or tape, optically scanned from hard copy by barcode or optical character readers or, as a last resort, entered by keyboard.

20

Upon entry into the message bank 30, the messages are stored in table format of the type illustrated in FIG. 4. The message bank 30 contains the date that the message is to be delivered, the priority of delivery (e.g., urgent), the type of message, (e.g., coupon, warning, advertisement,

etc.), the text and graphic of the message, the destination criteria (e.g., national, specific subscribers or stores, selected groups of subscribers or stores, etc.) and whether the message needs to be broken into parts due to its length.

The message bank will, on a daily basis, process those messages that are to be delivered during such day. FIG. 5 illustrates the manner in which a sample batch of message may be processed for a particular day. The messages are initially sorted by the date on which they are to be delivered and then by priority. Thus, all urgent messages or time sensitive promotions (e.g., priority 1) would be delivered before increasingly less urgent messages (e.g., priorities 2-0). Messages of a particular priority, e.g., 1 would be delivered in the order that they were initially received by the system.

Bits conforming to the bit-string sequence of the subscriber table identify the destination criterion identified in the message bank table. For example, FIG. 6 illustrates the application of the bit-string procedure discussed previously concerning the subscriber bank 10 with reference to a group of messages. Note, in particular, that by using the bit-string procedure heretofore discussed, it is possible to quickly and specifically target a group or groups of individuals or stores. For example, the coupon may be directed to a specific geographical area, a specific type of household or store and a specific income level or product or store competitive situation by simply identifying the applicable bit-string for the targeted groups.

The database manager 40 is a sophisticated system, preferably of the Oracle or Informix genre, due to its need to handle multiple databases including the subscriber directory 10, the message bank 30, and schedule the transmission of messages or packets of information.

The transmission sequence compiler 50 is a dedicated component with the responsibility for readying message batches so that they can be relayed to the pager network 70 in a controlled and efficient manner. Required tasks for the transmission sequence compiler 50 include sorting and sub-dividing the daily batch into sub-batches for optimal loading to the different modems and prioritizing within these sub-batches to ensure that the messages within the sub-batches are sequenced in accordance with urgency of delivery requirements. An important priority would be, for example, to ensure that early time-zone messages are queued early in the relay process.

FIG. 7 is a sample of the format in which a group of messages ready for transmission would be organized and FIG. 8 provides some examples of data that may be contained in such a table. Note that the messages are sorted by priority and then by message sequence number (MSN). The Destination Code String indicates whether the printer appliances are to receive data based on the individual PMA number or, alternatively, on the bit string code. For example, if the message is intended to be processed only by a particular PMA or RPD, the identification number of the targeted PMA or PMA's or RPD's will be indicated. In such manner, the destination Code String would be "0". Note that one or a multiplicity of PMA or RPD identification numbers can be provided.

Where, however, the message is intended to be processed by "groups" of subscribers based on criteria identified in the bit-string codes, the Destination Code String would read "1" or "2" depending upon whether the message was "public" or "private." If public, that is, if it is intended to be an unsecured message, the Destination Code String would be "1" and the Bit Code String

would be provided. Thus, if the message was intended to be processed by a particular group of subscribers, the bit-string of such group would be identified in the Bit String Code.

The system of the present invention has the ability to deliver private, secure messages to be printed on printer appliances containing a "private" key. In this manner, the Destination Code  
5 String would read "2" and both the PMA or RPD number and a Private Key Number unique to that printer appliance or receiver-printer-dispenser would be transmitted as part of the Destination PMA or RPD Code. Secure messages in a store environment may include reports, summaries, and individual unique store communications.

The transmission sequence compiler 50 assigns a unique Message Identification Number  
10 ("MIN") to each message for subsequent audit tracking. The MIN number represents that number of the batch in which the message was transmitted, e.g., 00001, followed by the Message Sequence Number and the year. Thus, the MIN for Message Sequence Number 152001 which was transmitted in the first batch in the year 1998 would be "0000115200198". The assignment  
15 of such a MIN permits the system to automatically track the transmission of each message delivered to the system. It further serves to facilitate tracking of production efficiency, volumetrics, and quality control measures.

The bank of modems 60 is the primary channel for telecommunication messages to the pager network 70. Conventional off-the-shelf modems such as, for example those provided by U.S. Robotics, Hayes or other conventional modems may be used. The capabilities of everyday  
20 modems are improving rapidly with standard transmission rates currently at least 56 KB. The bank of modems may be replaced by a dedicated cable TV link as the system grows.

Batches of messages from the sequence compiler 50 are telecommunicated by the message bank to the wireless pager network 70 by regular modem-modem interconnection. Such communications are buffered at the network head-end and broadcast as traffic permits. They may be maintained by the network in buffer storage and then transmitted in batches along with other messages or interlaced between other messages. This permits more efficient and convenient transmission and at lower costs than transmission at peak rates.

In certain applications, it may be necessary to install a dedicated traffic monitor, with message storage and retrieval modules, between the bank of modems 60 and wireless pager network 70. This utility is intended to efficiently integrate the high volume of lengthy print messages into the regular, pager transmission activity.

Major providers of pager networks are PageNet, SkyTel, ComCast and others. In addition to the foregoing, there are a host of regional pager networks including, for example, Page 2000 by the Southern New England Telephone Company.

It should, of course, be appreciated that the pager network system may constitute virtually any form of wireless broadcast or narrowcast system now known or developed in the future.

In a typical pager network, the messages are transmitted by the modem bank 60 to the wireless pager network 70 where they are amplified and transmitted to a teleport for uplink to the receiving satellite receiver. The messages are then re-broadcast to a plurality of receiver/re-transmitter towers which, again, amplify the signals and re-transmit the messages to the network of printer appliances or receiver-printer-dispensers 80.

The network of printer appliances or RPD's 80 consists of a plurality of individual printer appliances or RPD's 82, each having a unique serial number for identification purposes. These appliances include normal pager components and circuitry, combined with a thermal printer and enclosed in a case with a lid allowing easy access for paper placement.

5 A possible rendition of a printer appliance or RPD 82 is illustrated in FIG. 10 and a flow diagram of the function of the printer appliance or RPD 82 is shown in FIG. 11.

The printer appliance or RPD 82 includes a ferrite core antenna 83, a receiver 84, a decoder 85, filter or format generator 86, microprocessor 87 including random access memory 87A, write only memory 87B and an EPROM 87C, a power supply 88 and a printer 89, preferably  
10 of the thermal type although, in future years as the prices come down, it may be possible to use ink-jet or other computer type printers. A multiplicity of microprocessors 87, random access memory 87A or EPROMS 87C may be required for volume and packet size options to be utilized within each printer.

15 It is preferred that the thermal paper be stored in a fan-folded manner rather than a spool or roll although it should be appreciated that a spool or roll may be utilized in some applications.

The use of fan-fold paper enhances the design efficiency of the unit. Fan-fold paper provides higher residual paper storage density than roll paper. In addition, by perforating the paper, it facilitates separation of the message paper slips. It also folds and lays flat on delivery with minimal curing that is a serious problem with spooled thermal paper. Since the messages to be  
20 delivered using the information delivery system of the present invention are fixed format messages, such formats lend themselves to the use of fan-fold paper.

In a preferred embodiment, the receiver 84 of the printer appliance 82 is a standard pager receiver POCSAG Format, 2400 Baud and the decoder 85 is an off-the shelf POCSAG unit. Other formats than can be used include FLEX and GOLAY. The use of the FLEX format would provide a significant advantage in terms of providing back channel capability for message reception confirmation and is also much more power efficient than the POCSAG format.

A destination code eligibility-matching filter 86 and a basic microprocessor 87, preferably an 8031 or 8051 chip, are also included in the preferred embodiment, but advances in technology and improvements in economics may make RISC or other newer technology more desirable. 1 Kbytes of RAM 87A is typically sufficient along with at least 128 bytes of EPROM 87B, however more or less may be incorporated within various applications. The incorporation of write-only memory 87B is important to permit storage of the subscriber bit string eligibility filter, allowing subsequent matching with the messages being transmitted. In addition, a conventional consumer appliance type power supply 88 is preferred.

It should be appreciated that printers draw considerable wattage so that there is need for a dedicated power supply 88. Such a power supply 88 would preferably be a stand-alone module due to design and operation restrictions as well as economics. The main unit would be fitted with an LED power-on indicator 90 as shown in FIG. 10 so that a user may quickly see that the appliance is in an active mode.

The printer appliance or RPD 82 utilizes established POCSAG technology that is sufficient for most applications. Future versions of the appliance may incorporate a Motorola Flex receiver/decoders if improvements in performance criteria or economics become more attractive

or are required. Most of the other components such as the 8051 processor, RAM and EPROM are mass produced devices available at low cost.

The components of the printer appliance or RPD 82 represent the initial preferred embodiment of such device. The printer appliance or RPD 82 has inherent processing capabilities  
5 beyond simply providing the basic tasks. With additional components and control software, extended functionality can be readily incorporated.

The printer appliance or RPD 82 may also include, for example, an RS232 port (not shown) to permit transfer of messages to or from an auxiliary system such as a personal organizer, a laptop or desktop computer, smart card appliances etc. Relay to a personal computer permits  
10 messages to be archived, reformatted and the likes as well as offering a host of other print options. It should be appreciated that the printer appliance may also be upgraded to render it compatible with a cable television delivery system of messages such as the one, for example, described in United States 5,500,681 which issued on March 19, 1996 to Charles P. Jones for Apparatus and Method for Generating Coupons in Response to Televised Offers, the disclosure of  
15 which is hereby incorporated herein by reference thereto.

Similarly, the incorporation of an input port would permit the printer appliance to function as a utility printer to print, for example, e-mail messages (including communications store to store, from headquarters etc.) thereby rendering the printer appliance 82 a centralized message source.

20 The incorporation of an IR port (not shown) may also be of particular interest because it may be addressed by an intelligent remote control. See, for example, U.S. Patent No. 5,500,681



that describes a method for transmitting promotional messages via cable television, except print on demand in the current application is triggered by a remote control type device for selectively triggering the printing of stored information. Communication within the store may be from a central communication device to the individual printers via RF.

5           Incorporation of a display 90 for the printer appliance or RPD 82, preferably a LCD, may also serve to facilitate the user interface. It may, for example, flash urgent messages, allow the user to scroll and review messages and provide prompts for error conditions. With additional memory and software upgrades, the recipient may have the choice of visually reviewing the message and selectively printing only those messages that it selected in much the same manner  
10 they currently choose which e-mail messages to print.

As a transfer medium, the inclusion of a magnetic stripe or smart card reader/writer (not shown) into or as an optional attachment to the printer appliance or RPD 82 would also allow portability of the stored message, with subsequent printing done at the user's convenience. It is possible that, for example in the case of discount coupon messages, printers would be available at  
15 the retail establishment where the purchase is to be made. Apart from the portability aspect, limiting printing to only specifically authorized printers may add another layer of security to the process. In future generations of the system, it is possible that coupon messages would never have to exist in print form. Discount coupons stored on the transfer media may be read at the store checkout station or at an in-store kiosk or display incorporating the appliance and the card  
20 reader/writer attachment and the savings applied if the appropriate purchase was made.

In addition, confirmation means (not shown) can be incorporated into the printer appliance or RPD 82. In conventional paging network systems using POCSAG technology, there is no back-channel capability. Thus, the broadcaster does not receive any confirmation that the message has actually been delivered. In order to increase the reception probability, it is common to employ a redundancy process where repeat message packets are transmitted at different time intervals, but only printing from any printer appliance or RPD a single time.

Each message may be transmitted 2 or 3 times over a course of minutes to insure that they are received. The PMA is able to identify duplicate transmissions and reject the redundant transmission. The receiver has in-built sensing capabilities and ignores repeat receptions. This methodology has worked exceedingly well and will accommodate the vast majority of messages. Reception confirmation may be an issue in those cases where the message has a significant monetary value, as for airline or event tickets.

SkyTel has recently introduced a paging service that guarantees message reception and does incorporate back channel, confirmation capability. Their system is based on a new Flex component that does have response capability. Prior to actual message transmission, the particular receiver is polled by the network to determine whether the unit is in an active mode. If a "ready and able" response is echoed, the message is relayed repeatedly until the "AOK" reception confirmation is returned. This modern technology may be utilized when the underlying economics are more favorable for deployment in a high volume consumer appliance or within the store environment.

The entire system is practical and economically viable only if a large number of printer appliances or RPD's 82 are installed. Factors that will influence mass acceptance are price, design appeal, available distribution channels, ease of use, minimal user responsibility, and ready message display.

5 While the system of the present invention is designed to operate in a continuous message-dispatching mode, it is much more efficient if messages are handled in a batch mode. In this manner, a batch would consist of all messages that were due for delivery on any particular day. These daily batches would be transmitted during the late hours of the prior day and early hours of the due date to take advantage of the low network traffic conditions that exist during sleeping hours.

10 A unique feature of the system of the present invention resides in the security features of the system, which are intended to prevent fraud and counterfeiting. While some messages contain only information, others such as coupons or tickets have a defined monetary value and are likely candidates for fraud through unauthorized duplication. The present system employs at least five reproduction inhibition techniques: (1) chemically treated paper; (2) color printed edges; (3) reverse side printing; (4) incorporation of a high-resolution pattern; and (5) serial number printing.

In this regard, the printer appliances or RPD's 82 may employ special, coated thermal paper having a production identification so as to verify the paper source. Similarly, pre-printed color edges may be used on the paper to require color-replicating equipment for duplication.

20 Specific markings may also be printed on the reverse side of the paper that can be automatically sensed using opto-electronic means which can not only assist in alerting the recipient that the

appliance is out of paper or there is a paper jam but, also, will serve as a deterrent to unauthorized duplication.

Other deterrents that can be employed to prevent counterfeiting include the incorporation of a high-resolution pattern on the reverse side of the paper. Thus, reproduction may only be accomplished with sophisticated and expensive copy equipment. Finally, the printer appliance or RPD 82 would print its serial number on every outputted message which, in addition to providing a unique trace to origin, would serve as a further deterrent to counterfeiting since it is a declaration of identify. In the event that any replication activity was even suspected, a serial number erasure message may be transmitted to immediately disable the particular printer appliance or RPD. Alternatively, messages to a specific printer appliance may be eliminated by the system control center 20 or by a flag or field set into the subscriber directory 10 or even in the database manager 40.

With reference to FIG. 1, operation of the information delivery system of the present invention is as follows. The subscriber directory 10 would include the most relevant and current data for a given subscriber. As previously noted, the subscriber directory 10 would include all applicable bibliographic, demographic and user-characteristic information. It is anticipated that the information in the subscriber directory 10 would be updated on a regular basis as new members or stores are added or deleted, additional printers are added or deleted within a store, and as the information relating to a particular member or store changes. Such data can be inputted either manually or electronically.

It should be noted that for ease of distribution, it is advisable to assign bit-strings to the data contained for a particular subscriber. In this manner, messages can be broadcast for processing only by one or a number of specific appliances or, alternatively, by those appliances that have characteristics that match the criteria in the message. The use of bit-strings substantially reduces the amount of data that needs to be processed by the system when determining the potential recipients of a particular message.

Simultaneously, messages that are to be delivered are inputted into the message bank 30 with specific information concerning the message and delivery instructions, e.g., intended recipients, priority, time and date of delivery, etc.

Upon entry of the appropriate message or messages into the message bank 30 and the subscriber information into the subscription directory 10, the system control center 20 and the database manager 40 then reviews all messages stored in the message bank 30 and segregates them based on the date or dates on which they are to be delivered. Those messages that are to be delivered on a particular date or for a very limited time, like special "event" type promotions would be identified and segregated. A sample batch of typical messages to be delivered on a particular date is illustrated in FIG. 5.

The database manager 40 then assigns bit-string destination codes for the data contained in the batch of messages using the criteria previously identified in FIG. 6.

The message is then formatted by the inclusion of detailed text and graphics if so instructed. It is contemplated that the database manager 40 will include a vast store of graphic templates such as, for example, prior coupon images, invoice and appointment reminder layouts,

logos, simple product pictures, clip-art and a wide variety of text fonts. The database manager 40 would also incorporate a dedicated publisher module with access to the template files and a general capability for semi-automatically designing the printed-message layout. The publisher module would assist in the generation of publisher quality material and would include standards 5 logos, clipart and photographs that would be included in the message. In this manner, the message may simply reference a logo or piece of artwork contained in the publisher module that would then substitute the stored artwork or photographs for incorporation into the message.

In the case of manufacturer discount coupons, the industry guidelines require that the coupon be bar-coded using a standard UPC Coupon Code format which permits a retailer to 10 automatically scan the coupon at the checkout register. Basic code information identifies the issuing manufacturer, classifies product type with a group family code, and denotes the coupon value. An appendix code has recently been endorsed in UPC/EAN format that can carry additional information such as offer number, expiration date and household identification. The publisher may include a subsystem that would automatically generate the numbers for the bar 15 codes and embed them in the coupon message.

Prior to release for relay, the message images might require some manual editing in order to optimize the esthetic presentation of the image.

The compiler 50 then compiles all applicable messages for a particular date, puts then in priority order and then readies them for broadcast.

20 Where a specific message such as, for example, a message reminder, is to be transmitted to a single appliance, the message would include the specific serial number of the appliance to

which the message is to be directed. Similarly, where messages are to be distributed to all appliances, the message would include a default number common to all active appliances, e.g., 99999.

When messages are to be delivered to a profiled group of recipients, the Database Manager 40 would search the database, extract subscribers from the Subscriber Directory 10 matching the specific profile criteria, and then extract the serial numbers of the appropriate appliances from the Subscriber Directory for dissemination to such appliances. It is also possible, especially in the case of promotion or advertising messages that the sender will want delivery to as many recipients as can be reached on his particular roster. This would require that the Database Manager 40 to overlay the customer or store roster with the Subscriber Directory 10, and extract those serial numbers of the common entries.

Similarly, where the message is to be delivered to a group of subscribers, the bit-string code described above would be part of the message transmitted.

The final process in preparing the daily batch for transmission requires that the transmission sequence compiler 50 in FIG. 1 serializes the message code strings in a priority sequence as determined by delivery urgency. Some messages must be delivered the next day, while others may be carried over to the following day without difficulty. This allows for accommodation if the system becomes capacity stressed or slowed by high network traffic. The daily batch would actually be subdivided before sequence so that the smaller batches may be dispersed amongst many modems and messages and relayed in parallel to the head-end of the pager network 70. Messages will then likely be broadcast by the pager wireless pager network 70

within the normal pager frequency band of 929-932 MHz along with other regular paging message activity.

Messages are then received by all of the printer appliances or RPD's 82 in the appliance network 80. Functionally the printer appliance or RPD 82 operates as follows:

1. The broadcast messages are sensed by the antenna 83 and fed to the receiver 84.
2. The message signal is then pre-amplified and decoded in the CPU.
3. Message acceptance is achieved by the CPU 87 performing a software, password-matching processes. Each particular appliance has at least four levels of passwords, namely: (1) the default appliance serial number (all "9's" to accept and process national messages); (2) the specific appliance serial number (a unique number assigned to each individual appliance); (3) a bit-string eligibility code number (which is derived from the profile of the subscriber); and (4) the private PIN number as defined by the subscriber (for processing of highly secure messages). Each message is codes with one or more of the aforesaid numbers
4. RAM memory 87A is needed by the CPU 87 for performing multiple tasks including, for example, system management, message handling, destination code matching, bar code generation and the like. EPROM 87C would store security information, and in particular the appliance serial number. Information concerning the characteristics of the subscriber would be stored in the write-only memory 87B to protect against loss during a power failure.

FIG. 12 illustrates the critical, message eligibility process that the CPU in the local printer appliance 82 must perform. To determine whether a message is being addressed to a particular



printer appliance 82; the CPU interrogates the destination code header. If the Destination Code String is "0" indicating that the message may only be processed by a specific printer appliance or RPD or appliances, it then determines whether there is a match with the PMA or RPD number being transmitted with that of the appliance. If there is a match, the message is processed. If not,  
5 the process is aborted.

Similarly, if the Destination Code String is "1" indicating that only appliances with a particular bit-string code may process the messages, it then compares the bit-string of the appliance with that of the message. If there is a match to all or a predetermined percentage, the message is then passed on for processing. If there is no match, the process is aborted.

10 Lastly, if the Destination Code String is "2" indicating that the message is being transmitted to a specific appliance or appliances having a private key, it looks to match the PMA or RPD number of the message with that of the appliance. Standard encryption techniques used in RSA and PGP use a public key/private key encryption. An algorithm in the PMA or RPD will decrypt the message, process the decrypted message and print it out. It can only be decrypted by  
15 the PMA or RPD with the private key. If there is a match, it then performs a second function by attempting to match the appliance's private PIN number with the PIN number being transmitted. If both match, the message is processed. If not, the process is aborted.

FIGS 13 and 14 illustrate a particular sample of bit-string matching between the destination bit-strings contained within the broadcast message and the eligibility bit-string code  
20 number contained in the appliance. Note that there needs to be a complete match between the destination bit-string contained in the message and the bit-string of the appliance. In certain

situations, it may be feasible to permit the appliance to process a message where only a predetermined percentage of the bit-strings are matched, e.g., at least 25%.

FIG 15 illustrates the manner in which messages within the appliance may be processed and eventually printed using a message interpretation process. Incoming messages will typically  
5 be received in a highly condensed form as the Sequence Compiler has adopted compaction processes such as zipping, zero compression, bit packing and general data compression. The CPU must then decode and decompress the message content.

As previously discussed, in order for a Pager-Network provider to handle the message in a normal manner, the message must be contained within a specified packet length or, alternatively,  
10 will be packetized over multiple packets. Some messages, particularly coupons, will include significant graphic content and the total message may have to be transmitted in the form of a packet series. This necessitates inclusion of a pre-content header indicating the number of parts to the message. A byte indicator packet, for example 1 of 3, would serve to alert the system that the message is not complete until all three parts have been received and that the CPU will need to  
15 merge the packet contents and reconstruct the total page prior to generating print code.

A particular application of the subject invention involves using the wireless system to broadcast coupons to an array of in-store receiver-printer-dispenser units. FIG. 16 illustrates such a coupon distribution system, in which the components are described as: (1) reservation system  
100, (2) promotion control center 110, (3) graphics design module 120, (4) modems 130, (5)  
20 pager network (140) and (6) in-store arrays of receiver-printer-dispenser units 150. It should be appreciated that the reservation system 100 corresponds to the message bank 30, the modems 130

correspond to the bank of modems 60, the pager network 140 corresponds to the wireless pager network 70 and the in-store arrays of receiver-printer-dispenser units correspond to the network of printer appliances 80. The promotion control center 110 incorporates the system control center 20, subscriber directory 10, database manager 40 and transmission sequence compiler 50.

5 The addition of the separate graphics design module 120 is designed to facilitate the incorporation of graphical images into the coupons generated by the system.

The in-store array of receiver-printer-dispenser units 150 consists of a plurality of individual receiver-printer-dispenser (RPD) units 151, each having a unique serial number for identification purposes. A flow diagram of the function of the RPD units 151 is shown in FIG. 17.

10 The RPD unit 151 includes a ferrite core antenna 152, a receiver 153, a decoder 154, format generator 155, a reprint sensor 156, microprocessor 157 including random access memory 157A, flash memory 157B and an EPROM 157C, a power supply 158 and a printer 159. The functionality of the RPD unit 151 is significantly enhanced by the addition of the flash memory 157B and the reprint sensor 156, as well as by the addition of a visual display 166, audio  
15 component 168 and motion detector (not shown). On the assigned distribution date, the promotion control center 110 codes the detailed offer information into a format compatible with pager network 140 transmission requirements. These coded signals are relayed to the pager network 140 via a modems 130. In turn, the pager network 140 broadcasts the coupon offer signals which are detected by the RPD units 150 arranged in various configurations within a store.

20 The antenna 152 senses the coupon signal as broadcast by the pager network 140. A receiver 153, such as a Motorola POCSAG demodulates and amplifies this signal and relays it to the decoder

154 and format generator 155 so that the coupon can be printed. The coupon signal is also stored  
in flash memory 157B for later printing. An emitter-detector pair in the reprint sensor 156 detects  
removal of a coupon and orders a fresh coupon to be printed from the originally transmitted  
image as stored in flash memory 157B. This action would also activate a counter so that the  
5 volume of coupons distributed can be recorded.

The E-Prom 157C contains a unique serial number identifying each individual RPD unit  
151. Every transmitted message has a destination header containing the serial number of the  
particular RPD unit 151 eligible to receive the message. A matching operation is performed prior  
to full decoding to determine whether an incoming message is eligible for printing.

10 A schematic of a basic RPD unit 151 is shown in FIG 18, and an illustration of a typical  
shelf RPD unit 151 is shown in FIG. 19. In the preferred embodiment, the physical dimensions of  
the RPD unit 151 are 8 inches high by 4 wide and 2 inches deep. Such dimensions allow the RPD  
unit 151 to be placed on a display shelf without obstructing the products unnecessarily, while still  
being large enough to be visible to a consumer and to print coupons. The RPD unit 151 may  
15 include a paper loader 160 for insertion of the paper that coupons 162 are printed upon. A status  
indicator 164 may consist of an LED that lights when the RPD unit 151 is active or flashes when  
there is an internal error. In the basic RPD unit 151 shown in FIG. 18, the reprint sensor 156 is of  
the form of an LED emitter/silicon detector pair.

The RPD unit 151 may also be fitted with a display 166 for the display of a visual message  
20 appropriate for the product or coupon 162, as well as a speaker module 168 for the broadcast of  
an audio message relative thereto. The display 166 may include any type of electro-optical

signage such LED, LCD, Plasma or CRT, depending upon configuration of the RPD unit 151 and its location in the store. LED or LCD may be more appropriate for smaller configurations such as bulletin boards or shelf units while Plasma or CRT would be more suitable for bigger kiosk or end-cap configurations. The speaker module 168 is composed of a dedicated receiver, controller, voice-chip, speaker and a motion sensor (not shown). As a potential customer comes within range of the coupon dispenser, the motion detector would activate the audio message in order to entice a customer to take the coupon.

The RPD units 151 can be arranged in a variety of configurations such as bulletin boards, wall displays, entry kiosks, end of aisle stands and shelf displays. The configuration of the RPD units 151 are detailed in a store layout plan in which each array configuration is designated by type, position in the store, and the serial number of each RPD unit in each array.

A bulletin board dispenser 170 is illustrated in FIG. 20. This configuration is composed of multiple RPD units 151 assembled on a plug-in board 172 with a large display module 174. The display module 174 may be an LCD or LED display controlled by display controller 176. The bulletin board dispenser 170 may also include an audio module with speakers 178. The display module 174, audio module 178 and RPD units 151 would all be provided power by power supply modules 179.

Figure 21 through 24 illustrate various other configurations for the RPD units 151 in store displays. In all the configurations, visual and audio displays could be incorporated to create further interest. Figure 21 shows an end-cap dispensers 180 configuration wherein an array of RPD units 151 are arranged to attract attention and provide easy accessibility to the dispensed

coupons. Figure 22 depicts a booth or kiosk display 182 with an array of RPD units 151. Figure 24 is a sample floor plan showing a variety of different RPD unit 151 displays, including booth displays 182, end-cap dispensers 180, shelf dispensers 184 and bulletin board dispensers 170.

In an alternate embodiment of the current invention, the RPD units 151 may be  
5 programmed locally by a store operator to add promotions directly. Such a facility enables the retailer to run his own promotions on RPD units 151 scheduled for this purpose. The local load out could be done via the pager network or, alternatively, through a dedicated loading module.

In yet another embodiment of the current invention, software is provided for entering and encoding promotions directly. The software would be installed on the store computer and relay  
10 of the promotion would occur via modem to the pager network and on to the addressed RPD units 151. Alternatively, this software could be installed on a computer at the retailer headquarters which could then control all retail promotions for the complete store/chain roster. This adaptation at the store or headquarters could also be used to interface or integrate the current invention with an in-store loyalty program. Or, this adaptation of the current invention could be used for sending  
15 secure/confidential messages throughout the chain or to individual stores. Secure messages in a store environment may include reports, summaries, and individual, unique store communications.

In still another alternate embodiment, a dedicated piece of hardware including a central processing unit, keyboard, display, memory and a local RF transmitter emulating a normal pager network signal may be used by an operator to configure and address any particular RPD unit 151  
20 and enter a desired promotion.

